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THE CHALLENGE OF UNIVERSAL FOOD QUALITY AND SAFETY REGIME

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THE EFFECT OF THICKENING AGENTS ON THE TEXTURAL PROPERTIES OF GUAVA FRUIT LEATHER

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ABSTRACT

Most tropical fruits cannot be kept for a substantial period of time and thus easily rot. Drying is one common method to prolong its shelf life. Guava is known for its high nutrient contents, especially vitamin C. Guava Leather is an example of a food product made from guava puree with the addition of sucrose, citric acid and thickening agent; molded to an approximate 2.00 mm thickness; and then dried at 70°C for 9 hours until a thin skin-like layer is formed. Citric acid is added to maintain the flavour and acidity of the product, and also to control Maillard browning. Sucrose is responsible for giving the body dan the sweet taste to the product. Thickening agents are added to substantially modify the product's properties, such as taste, texture, and thickness. Thickening agents also increase the product stability and improve suspending action. The objective of this research was to study the effect of thickening agents on the textural properties of Guava Leather. Thickening agents used in this research were guar gum, xanthan gum, and maltodextrin in 0.3%, 0.4%, and 0.5% concentrations. The thickeners strongly affected texture among samples. Each thickener used produced its own textural characteristics to the Guava Leather. Objective tests on Guava Leather including chewiness, cohesiveness, and springiness tests were done using Texture Analyzer TA Lloyd Plus. The results demonstrate the effects of treatment on the chewiness, cohesiveness, and springiness of Guava Leather. Guava Leather with the addition of thickening agents tends to have a greater chewiness, cohesiveness, and springiness than the product without the thickening agent. Guava Leather with the greatest cohesiveness is Guava Leather with the additon of 0.4% of xanthan gum and the greatest chewiness and springiness are with the additon of 0.4% of guar gum as the thickening agent.

Keywords: *Guava Fruit Leather, Thickening Agent, Guar Gum, Xanthan Gum, Maltodextrin*

INTRODUCTION

Most tropical fruits cannot be kept for a substantial period of time and thus easily rot. Guava is known for its high nutrient contents, especially vitamin C. Consuming more fruit has been symbolic for the trend of a healthy life style. Restructured fruit, such as fruit leather, can be an economic and convenient value-added substitute for natural fruits as a source of a variety of nutrient elements, especially vitamin C. In addition, it can also be a useful outlet for low-grade fruits and by products from other processes using fruits. Furthermore, fruit leather, has far less calories (<100 kcals per serving) than many other snacks (Huang & Hsieh, 2005).

Thickening agents (Maltodextrins, Xanthan Gum, and Guar Gum) are substances which, when added to an aqueous mixture, increase its viscosity without substantially modifying its other properties. Maltodextrins are easily dispersed into water or other aqueous-based systems. Maltodextrins are used as crystallisation inhibitor. It prevents sweets appearing sand and extend the shelf life. Xanthan Gum is a natural biopolymer produced by fermentation process from the bacterium Xanthamonas compestris. Xanthan gum is used to keep ingredients suspended uniformly and provide thickening to enhance a formulation's mouth feel. Guar Gum is a galactomannan

obtained from the seed kernel of the guar plant Cyamopsis tetragonoloba. It is a versatile thickener and stabilizer used in bakery and confectionary products (Imeson, 1999).

The objective of this research was to study the effect of thickening agents on the textural properties of Guava Leather.

MATERIAL AND METHODS

Red guava were purchased from local market for the experiment. The first step was washing of guava to remove dirt, soils, and foreign materials. Then, it were trimmed and steam blanched for three minutes. After that, the guava were crushed, the seeds and skins were separated from guava puree by filtration. Sugar content of the puree was measured with brix refractometer and added with sucrose until 23°Brix. to the puree to give some sour flavor. Guava puree then poured into the mold at approximate 2.mm thickness and dehumidied for about 8 to 10 hours at 70°C until the moisture content 10-15%.Thickening agents used in this research were guar gum, xanthan gum, and maltodextrin in 0.3%, 0.4%, and 0.5% concentrations.springiness).The moisture content was measured with moisture analyzer. The guava leather were cut and analyzed with texture analyzer TA Lloyd Plus to test 3 TPA profiles (chewiness, cohesiveness, and springiness)

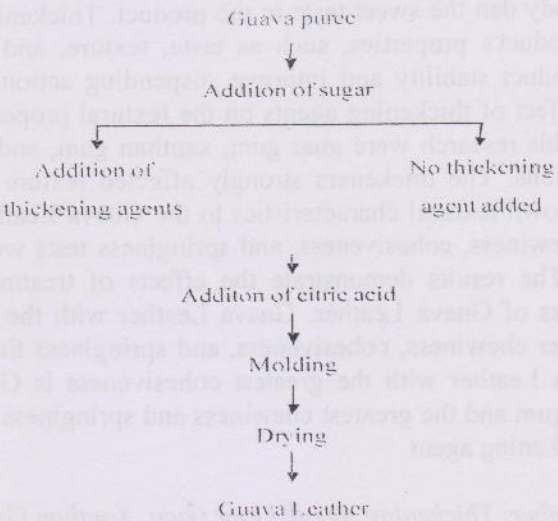

Figure 1. Guava Leather Production Flowchart

RESULTS AND DISCUSSION

The results demonstrate the effects of treatment on the TPA properties of Guava Leather.

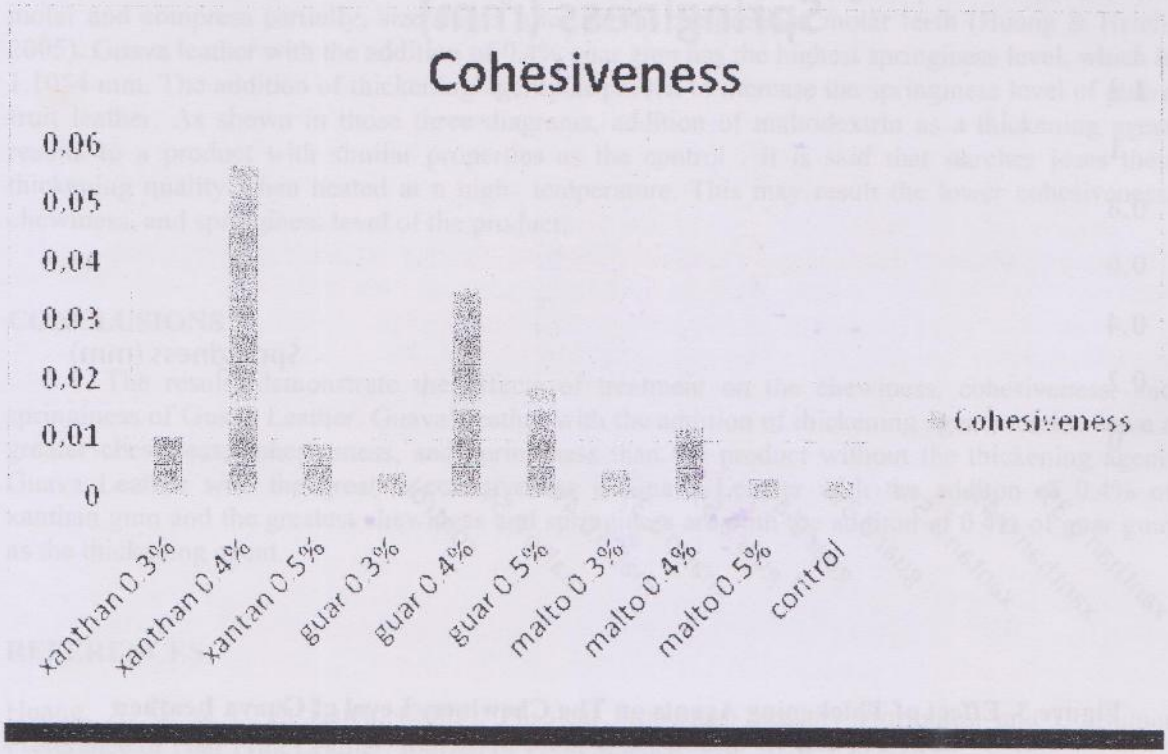

Figure 2. Effect of Thickening Agents on The Cohesiveness Level of Guava Leather

Cohesiveness is the strength of the internal bonds making up the food. Guava leather with the addition of 0.4% xanthan gum has the gratest cohesiveness level, which is 0.0566. The control Guava leather has the lowest cohesiveness level. This shows that addition of xanthan gum in the making process of guava leather produces end product with higher internal strenght compared to other thickening agent. According to the result, it can be concluded that addition of xanthan gum as a thickening agent results to a tougher end product because of one feature of xanthan gum solution is its viscoplasticity, which gives a high yield value even at low concentrations that may stabilise dispersions of xanthan emulsions. Xanthan solutions are stable over a wide range of pH and can be used in formulations containing acetic, citric, or phosphoric acid (Imeson, 1999).

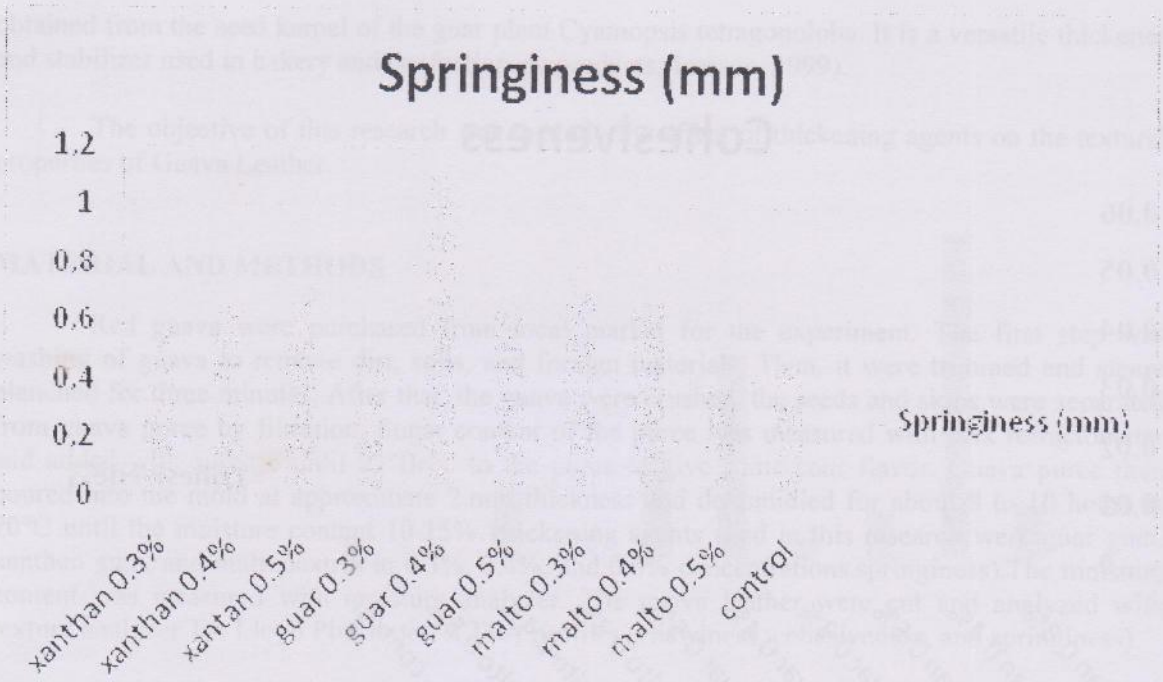

Figure 3. Effect of Thickening Agents on The Chewiness Level of Guava Leather

Chewiness is the energy required to chew a solid food until it is ready for swallowing. Guava leather with the addition of 0.4% guar gum has the highest chewiness level, which is 0.0612 kgf.mm. The difference is substantial compared to the control. Overall, the diagram shows that addition of thickening agents results in the increase of chewiness level. Additon of maltodextrin as thickener results a less chewy end product compared with xanthan gum and guar gum.

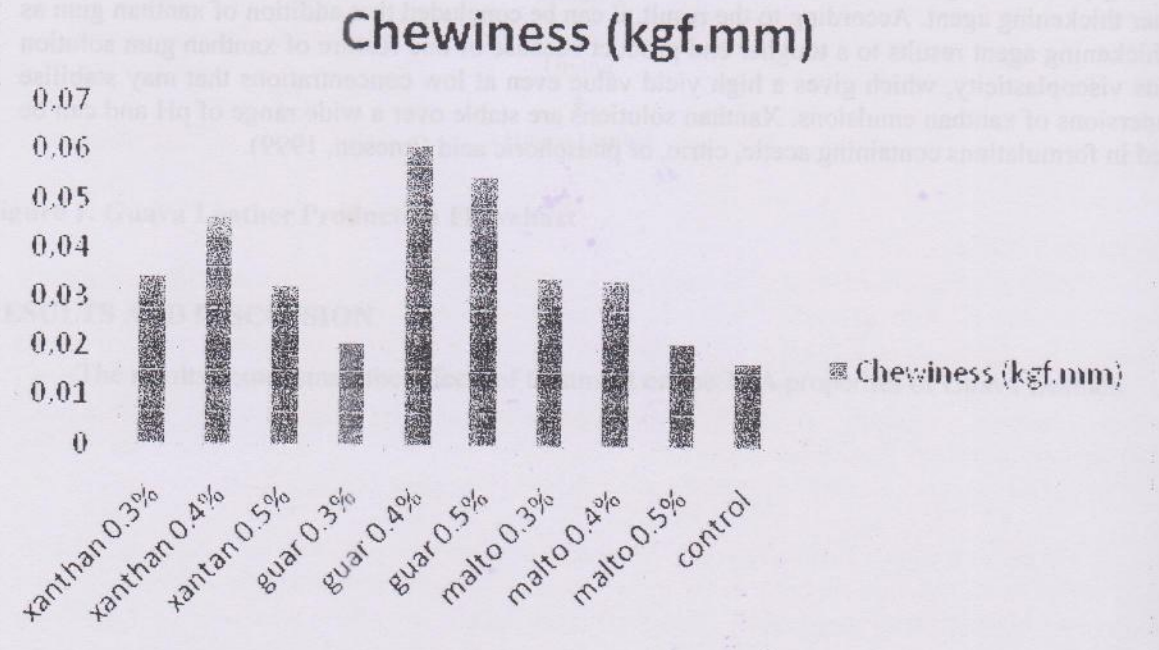

Figure 4. Effect of Thickening Agents on The Springiness Level of Guava Leather

Springiness is the force with which the sample return to its original place sample between molar and compress partially; size/shape, after partial compression molar teeth (Huang & Hsieh, 2005). Guava leather with the addition of 0.4% guar gum has the highest springiness level, which is 1.1054 mm. The addition of thickening agent has proven to increase the springiness level of guava fruit leather. As shown in those three diagrams, addition of maltodextrin as a thickening agent results to a product with similar properties as the control . It is said that starches loses their thickening quality when heated at a high temperature. This may result the lower cohesiveness, chewiness, and springiness level of the product.

CONCLUSIONS

The results demonstrate the effects of treatment on the chewiness, cohesiveness, and springiness of Guava Leather. Guava Leather with the addition of thickening agents tend to have a greater chewiness, cohesiveness, and springiness than the product without the thickening agent. Guava Leather with the greatest cohesiveness is Guava Leather with the additon of 0.4% of xanthan gum and the greatest chewiness and springiness are with the additon of 0.4% of guar gum as the thickening agent.

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